# Karan Srivastava

(217) 904 9350 | ksrivastava090198@gmail.com | LinkedIn://ksrivastava1 | Website: Karansrivastava.com

## EDUCATION

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| **MA, PhD in Mathematics** \| *University of Wisconsin-Madison* | Expected 2025 |
| PhD Minor in Computer Science | GPA: 3.57/4 |
| **BSc. Mathematics** \| *University of Illinois at Urbana-Champaign* | May  2020 |
| Magna Cum Laude with Highest Distinction in Mathematics | GPA: 3.97/4 |
| **Study Abroad** \| *Independent University of Moscow* | Spring 2019 |
| *Graduate Courses in Pure Mathematics, Math in Moscow Program* | GPA: 3.87/4 |

## RESEARCH EXPERIENCE

*PhD Work, University of Wisconsin-Madison and Wisconsin Institute for Discovery*  Aug 2020 – present
- Developing ***reinforcement learning models*** in PyTorch and Julia that generate data for problems in pure math.
- Testing ***graph convolutional network architectures*** for detecting hidden cliques in graph networks.
- Found bounds for a novel method of ***reconstructing linear data*** **robust to noise** and published findings at the IEEE ISIT 2022. Slides, code, and paper can be found here.

## SELECTED PROJECTS

**Learning Tic Tac Toe with Reinforcement Learning**  July 2023 - Aug 2023
- Implemented a ***reinforcement learning***  model in Python that learns tic tac toe from just the rules. *Github link*
- With no heuristic information, the agent learns how to play with **100% accuracy** by playing 10,000 games.

**Erdös Institute | Data Science Bootcamp**
*CoverMyMed Copayment Prediction*  Nov 2022 - Jan 2022
- Worked in a team of 3 PhD students and postdocs to reduce bias and predict copayments based on patient information with **RMSE ~$15.30** compared to ~$40 in baseline models**.**
- Developed ***gradient boosting, random forest, and other machine learning models*** on a large synthetic dataset of **~13.9 million rows***. Github link*

*What's Cooking? Cuisine Analysis*  May 2022 – July 2022
- Worked in a team of 3 PhD students to classify cuisines based on ingredients and apply clustering techniques to find similarities in a Kaggle dataset of **~60,000 entries.**
- Developed a ***random forest, linear SVC, and other machine learning models*** to achieve **classification accuracies of ~ 80%**. Github link

**University of Wisconsin**  Aug 2022 - Dec 2022
*Causal Inference through Machine Learning*
- Designed **Support Vector Regression models** that can uncover certain causal relationships in synthetic and real-world data with **~90% confidence***. Github Link*.
- Synthesized advancements in **causal learning** and my own theoretical and experimental work in a blog post.

## SKILLS

- **Languages:** Python, SQL (Basic), Julia, Mathematica, C++ (Basic), Java, Latex,
- **Python Libraries:** Pytorch, Tensorflow, Keras, Pandas, Scikit-Learn, Numpy, Seaborn, BeautifulSoup
- **OS and Platforms**: Bash, GitHub(ksrivastava1), MacOS, Jupyterlab, VSCode, Linux computing clusters.

## LEADERSHIP AND SERVICE

**Madison Experimental Math Lab,** University of Wisconsin-Madison  2022 – present
- Organize ~45 undergraduate research projects with faculty and PhD mentors over many semesters.
- Running a project on using **reinforcement learning** to study algorithms in number theory.

**Directed Reading Program,** University of Wisconsin-Madison  2021 – present
- Organizes a reading program that grouped ~300 undergraduate students with PhD mentors.
- Designed 3 projects in **machine learning**, **graph neural networks**, and algebraic geometry.

**Math Circle,** University of Wisconsin-Madison  2021 – 2022
- Organized ~30 mathematical talks and workshops by university researchers for local middle and high schools.

**Undergraduate Mentor Program,** University of Wisconsin-Madison  2022 – present
- Founded and organized a mentorship program that paired ~30 PhD mentors with undergraduates.

## CERTIFICATES AND AWARDS

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| **Institute for Foundations of Data Science Research Assistantship:** $12,000 Research Grant | Aug 2023 - Jan 2023 |
| **Campus-wide Exceptional Service Award:**  Awarded to 3/2300 Teaching Assistants | 2022-2023 |
| **Departmental Exceptional Service Award:**  Awarded to 2/120 Math Dept. Teaching Assistants | 2022-2023 |
| **Exceptional Teaching Award:**  Demonstrated excellence in teaching for 4 or more semesters | 2020-2022 |
| **Edmund J. James Scholar:**  Awarded to top 15% of undergraduates campus-wide | 2017-2020 |
| **Dean's List**, University of Illinois at Urbana-Champaign | All semesters |